Activity	Data Type
Number of beatings from Wife	Discrete
Results of rolling a dice	Discrete
Weight of a person	Continuous
Weight of Gold	Continuous
Distance between two places	Continuous
Length of a leaf	Continuous
Dog's weight	Continuous
Blue Color	Discrete
Number of kids	Discrete
Number of tickets in Indian railways	Discrete
Number of times married	Discrete
Gender (Male or Female)	Discrete

Q1) Identify the Data type for the Following:

Q2) Identify the Data types, which were among the following

Nominal, Ordinal, Interval, Ratio.

Data	Data Type
Gender	Nominal
High School Class Ranking	Ordinal
Celsius Temperature	Interval
Weight	Ratio
Hair Color	Nominal
Socioeconomic Status	Ordinal
Fahrenheit Temperature	Interval
Height	Ratio
Type of living accommodation	Ordinal
Level of Agreement	Ordinal
IQ(Intelligence Scale)	Ratio
Sales Figures	Ratio
Blood Group	Nominal
Time Of Day	Ordinal

Time on a Clock with Hands	Interval
Number of Children	Nominal
Religious Preference	Nominal
Barometer Pressure	Interval
SAT Scores	Interval
Years of Education	Ordinal

Q3) Three Coins are tossed, find the probability that two heads and one tail are obtained?

Answer -: P (Two heads and one tail) = 37.5%

Q4) Two Dice are rolled, find the probability that sum is

a) Equal to 1
Answer -: P(A) = 0

b) Less than or equal to 4
Answer -: P(A) = 0.166 =16.66%

c) Sum is divisible by 2 and 3
Answer -: P(A) = 0.166 = 16.66%

Q5) A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

Answer -:
N (Event (2 balls are drawn randomly from bag) = 7! / 2! * 5!

= (7*6*5*4*3*2*1) /

(2*1) * (5*4*3*2*1)

N (Event (2 balls are drawn randomly from bag) = (7*6)/ (2*1) = 21

If none of them drawn 2 balls are blue = 7 – 2 = 5

N (Event (None of the balls drawn is blue) = 5! / 2! * 3! = (5*4) / (2*1)

= 10

P (None of the balls drawn is blue) = N (Event (None of the balls drawn is blue) /

N (Event (2 balls are drawn randomly from bag)

= 10 / 21

Answer = 0.4716

Q6) Calculate the Expected number of candies for a randomly selected child

Below are the probabilities of count of candies for children (ignoring the nature of the child-Generalized view)

CHILD	Candies count	Probability
A	1	0.015
B	4	0.20
C	3	0.65
D	5	0.005
E	6	0.01
F	2	0.120

Child A – probability of having 1 candy = 0.015.

Child B – probability of having 4 candies = 0.20

Answer -: 0.015+0.8+1.95+0.025+0.06+0.24 = 3.09

Expected number of candies for a randomly selected child = 3.09

Q7) Calculate Mean, Median, Mode, Variance, Standard Deviation, Range & comment about the values / draw inferences, for the given dataset

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For Points,Score,Weigh>

Find Mean, Median, Mode, Variance, Standard Deviation, and Range and also Comment about the values/ Draw some inferences.

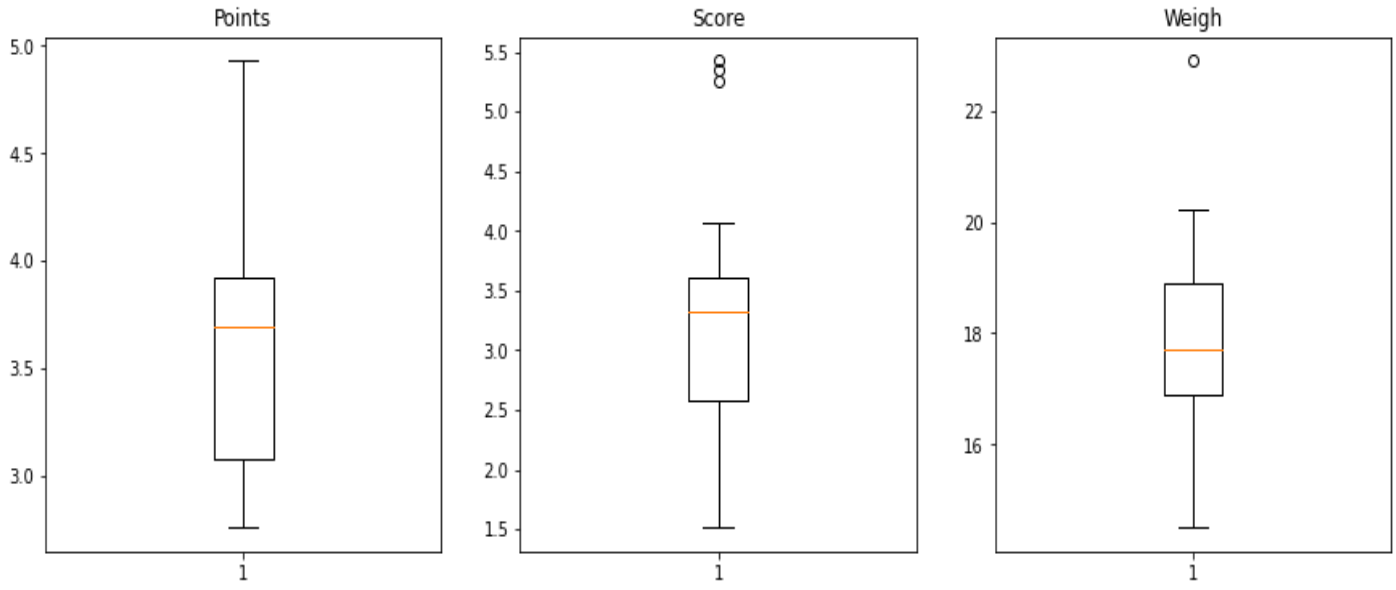
Use Q7.csv file

Answer -:

	Points	Points	weigh
Mean	3.596563	3.21725	17.84875
Mode	3.695	3.325	17.71
Median	3.92	3.44	17.02
Std	0.53468	0.97846	1.78694

Range [Min-Max] for Points [3.59 – 4.93], Score [3.21 – 5.42] and Weigh [17.84 – 22.9]

Draw Inferences -:



Q8) Calculate Expected Value for the problem below

a) The weights (X) of patients at a clinic (in pounds), are

108, 110, 123, 134, 135, 145, 167, 187, 199

Assume one of the patients is chosen at random. What is the Expected Value of the Weight of that patient?

Answer -: Expected value = Sum (X * Probability of X)

$= (1/9)(108)+ (1/9)(110)+ (1/9)(123)+ (1/9)(134)+ (1/9)(145)+ (1/9)(167)+ (1/9)(187)+ (1/9)(199)$

Expected value = 145.33

Q9) Calculate Skewness, Kurtosis & draw inferences on the following data

Cars speed and distance

Use Q9_a.csv

Answer -: Skewness - np.round(data.skew(),2)

Cars speed = -0.12

Cars distance = 0.81

Kurtosis -: np.round(data.kurt (),2)

Cars speed = -0.51

Cars distance = 0.41

SP and Weight(WT)

Use Q9_b.csv

Answer -: Skewness - np.round(data.skew(),2)

Cars speed = 1.61

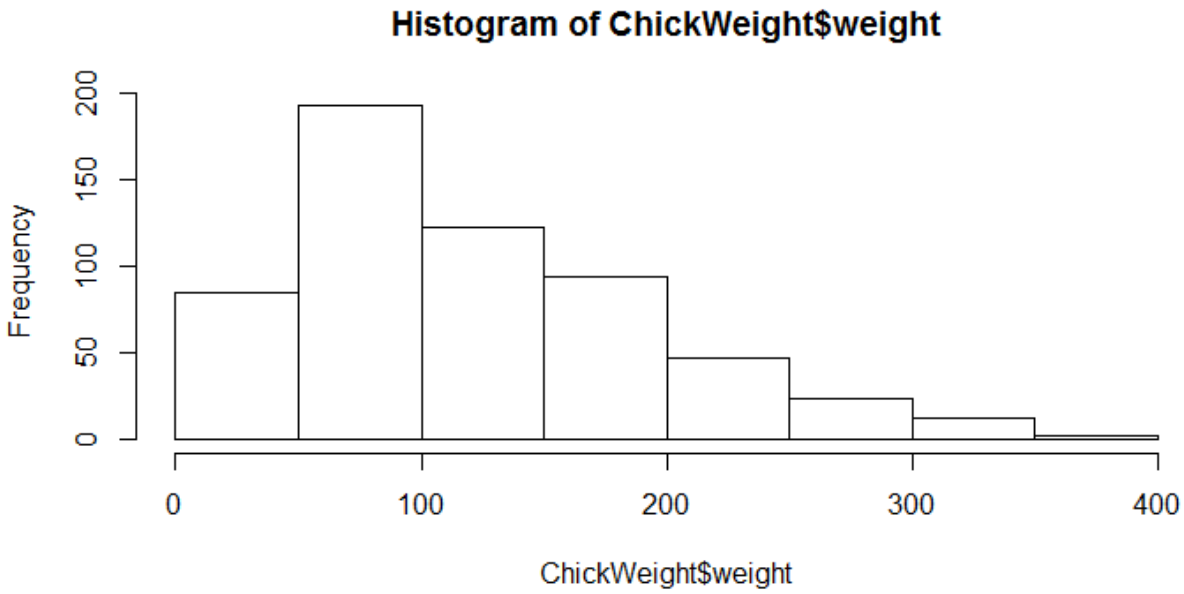
Cars weight = -0.61

Kurtosis -: np.round(data.kurt (),2)

Cars speed = 2.98

Cars weight= 0.95

Q10) Draw inferences about the following boxplot & histogram



HISTOGRAM -:

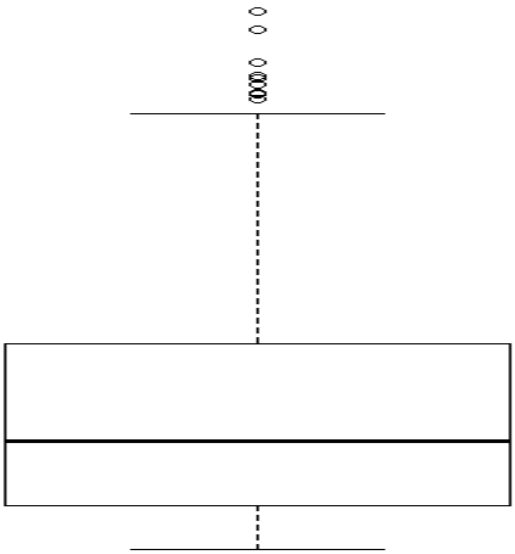
-chick Weight data is right skewed or positively skewed

-more than 50% chick weight is between 50 to 150.

-most of the chick weight is between 50 and 100

-highest frequecy is near to 200.

-The histograms peak has right skew and tail is on right. Mean > Median. We have outliers on the higher side.



BOXPLOT

-The data is right skewed .

-There are outliers at upperside

Q11) Suppose we want to estimate the average weight of an adult male in Mexico. We draw a random sample of 2,000 men from a population of 3,000,000 men and weigh them. We find that the average person in our sample weighs 200 pounds, and the standard deviation of the sample is 30 pounds. Calculate 94%,98%,96% confidence interval?

Answer -:

Average weight of adult in mexico with 94% CI is

=np.round(stats.norm.interval(0.94,200,30/(2000**0.5)),4)

([198.7383, 201.2617])

Average weight of adult in mexico with 98% CI is =

np.round(stats.norm.interval(0.98,200,30/(2000**0.5)),4)

([198.4394, 201.5606])

Average weight of adult in mexico with 96% CI is =

np.round(stats.norm.interval(0.96,200,30/(2000**0.5)),4)

([198.6223, 201.3777])

Q12) Below are the scores obtained by a student in tests

34,36,36,38,38,39,39,40,40,41,41,41,41,42,42,45,49,56

1) Find mean, median, variance, standard deviation.

Answer -:

Mean -: 41.0
Median -: 40.5
Variance -: 25.5294117647
Standard deviation -: 5.052663828

2) What can we say about the student marks?

Answer -:

Most of the student marks in between 36 to 42.
Maximum marks is 56.
Minimum marks is 34.
The students marks are good

Q13) What is the nature of skewness when mean, median of data are equal?

Answer -: distribution is symmetric and it has zero skewness.

Q14) What is the nature of skewness when mean > median ?

Answer -: positive/right nonparametric skewness.

Q15) What is the nature of skewness when median > mean?

Answer-: negative/left nonparametric skew

Q16) What does positive kurtosis value indicates for a data ?

Answer -: A distribution with a positive kurtosis value indicates that the distribution has heavier tails than the normal distribution

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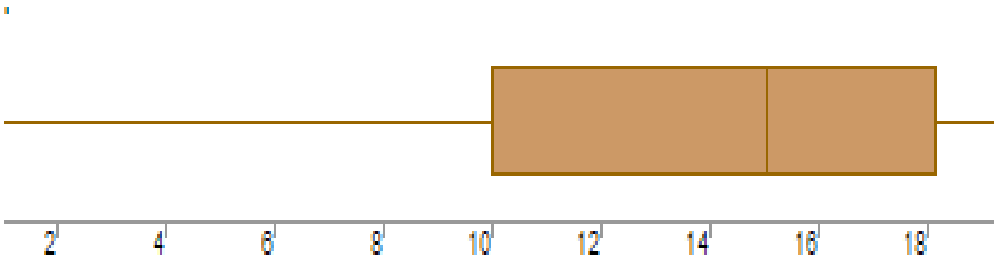
Q17) What does negative kurtosis value indicates for a data?

Answer-: A distribution with a negative kurtosis value indicates that the distribution has lighter tails than the normal distribution.

Q18) Answer the below questions using the below boxplot visualization.



What can we say about the distribution of the data?

Answer-: This distribution say all data present between 10 to 18

Median value is 15 and maximum value is 18 and minimum value is

10. these distribution show left skewness because median is closer to

The upper quartile

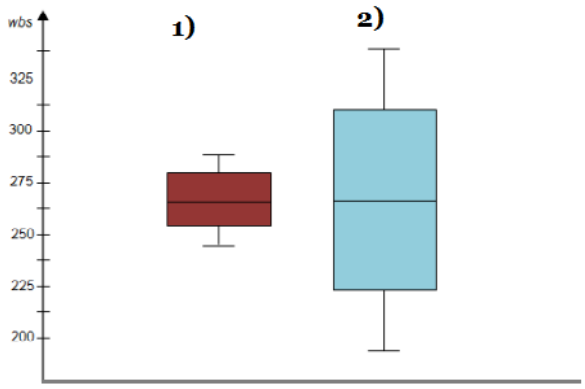
What is nature of skewness of the data?

Answer-: distribution is negatively skewed

What will be the IQR of the data (approximately)?

Answer -: IQR = 8

Q19) Comment on the below Boxplot visualizations?



Draw an Inference from the distribution of data for Boxplot 1 with respect Boxplot 2.

Answer -: First there are no outliers. Second both the box plot shares the same median that is approximately in a range between 275 to 250 and they are normally distributed with zero to no skewness neither at the minimum or maximum whisker range. second boxplot is more spread

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Q 20) Calculate probability from the given dataset for the below cases

Data _set: Cars.csv

Calculate the probability of MPG of Cars for the below cases.

MPG <- Cars$MPG

a. P(MPG>38)

Answer-: = 1-stats.norm.cdf(38,cars.MPG.mean(),cars.MPG.std())
= 0.3475

b. P(MPG<40)

Answer-: = stats.norm.cdf(40,cars.MPG.mean(),cars.MPG.std())

= 0.7293

c. P (20<MPG<50)

Answer-:

= stats.norm.cdf(0.50,cars.MPG.mean(),cars.MPG.std())-

stats.norm.cdf(0.20,cars.MPG.mean(),cars.MPG.std())

= 1.2430

Q 21) Check whether the data follows normal distribution

a) Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

Answer-:

cars.MPG.median() = 35.1527

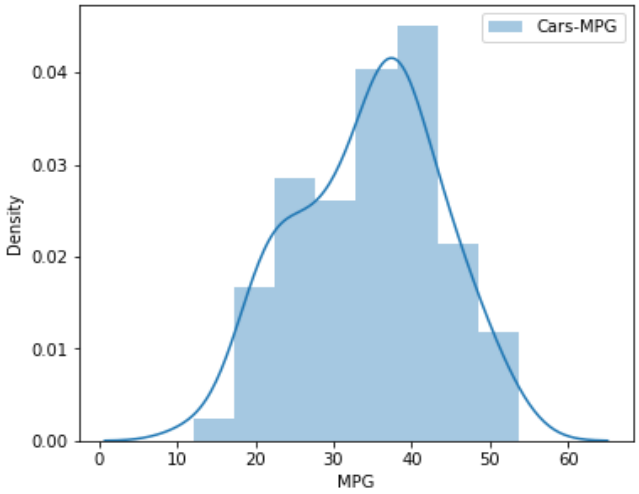
cars.MPG.mean () = 34.4220

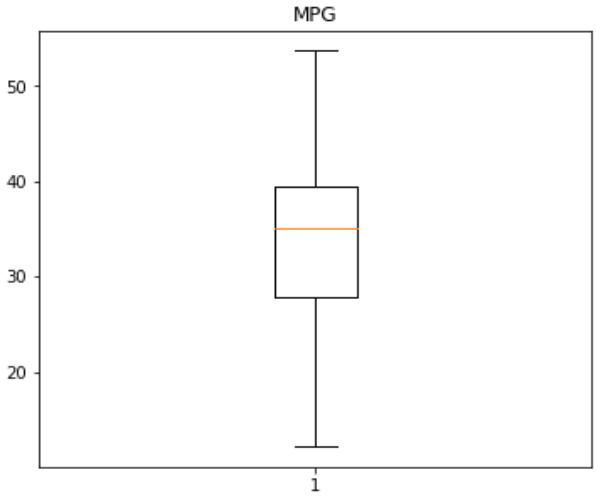
cars.MPG.std() = 9.1314

cars.MPG.var () = 83.3832

cars.MPG.min () = 12.10126289

cars.MPG.max () = 53.70068138

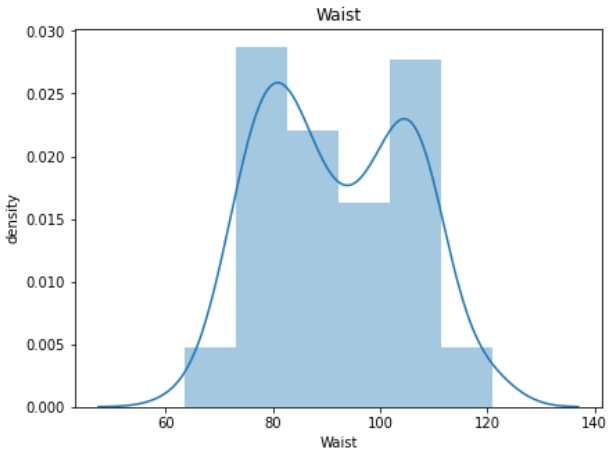


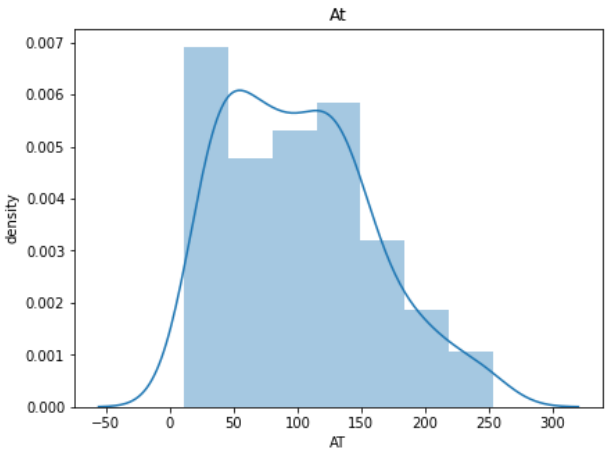


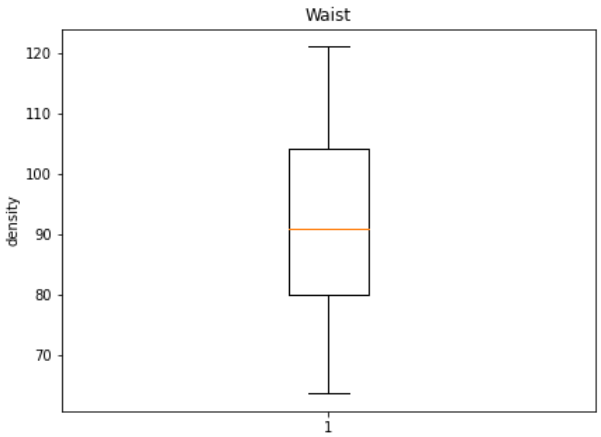
b) Check Whether the Adipose Tissue (AT) and Waist Circumference(Waist) from wc-at data set follows Normal Distribution

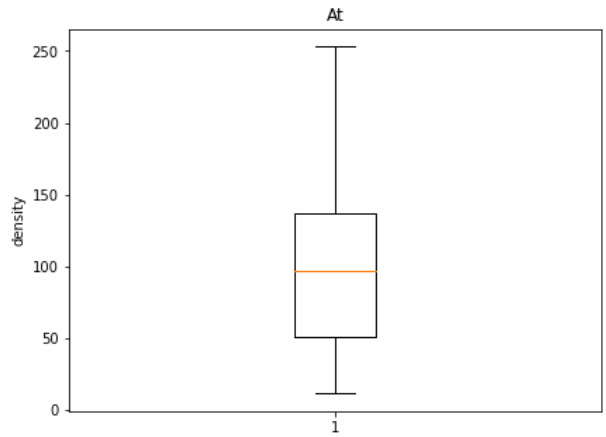
Dataset: wc-at.csv

	Adipose Tissue (AT)	Waist Circumference(Waist)
Mean	101.8940	91.9018
Median	96.54	90.8
Std	57.2947	13.5591
Var	3282.6898	183.8496
Max	253.0	121.0
Min	11.44ss	63.5









Q 22) Calculate the Z scores of 90% confidence interval,94% confidence interval, 60% confidence interval

Answer-:

Z-score of 90% confidence interval
=stats.norm.ppf(0.95)
=1.6448

Z-score of 94% confidence interval
=stats.norm.ppf(0.97)
=1.8807

Z-score of 60% confidence interval
=stats.norm.ppf(0.8)
=0.8416

Q 23) Calculate the t scores of 95% confidence interval, 96% confidence interval, 99% confidence interval for sample size of 25

Answer-:

i. **t scores of 95% confidence interval for sample size of 25**
=stats.t.ppf(0.975,24)
=2.0638
ii. **t scores of 98% confidence interval for sample size of 25**
=stats.t.ppf(0.98,24)
=2.1715
iii. **t scores of 99% confidence interval for sample size of 25**
=stats.t.ppf(0.995,24)
=2.7969

Q 24**)** A Government company claims that an average light bulb lasts 270 days. A researcher randomly selects 18 bulbs for testing. The sampled bulbs last an average of 260 days, with a standard deviation of 90 days. If the

CEO's claim were true, what is the probability that 18 randomly selected bulbs would have an average life of no more than 260 days

Hint:

rcode → pt(tscore,df)

df → degrees of freedom

Answer-:

import numpy as np

Import scipy as stats

t_score = (x - pop mean) / (sample standard daviation / square root of sample size)

(260-270)/90/np.sqrt(18))

t_score = -0.471

stats.t.cdf(t_score, df = 17)

0.32 = 32%